CLAIMS

1. Affinity sensor for detecting specific binding events comprising a carrier substrate (1), provided with at least two electrodes (2) and a range (4), said electrodes being equidistantly spaced apart from each other and engagingly border said range (4) from both sides, at least said range (4) being adapted for receiving immobilized specific binding partners (5), said specific binding partners (5) being capable of coupling complementarily associated binding partners (6) directly or via further specific binding molecules (7), said range (4) having a minimum width b being adapted to capture at least one complementarily associated binding partner (6), which is provided with one electrically conductive particle (62) in said range in such a way to allow for the formation of a respective tunnel contact junction between the particle (62) and the electrodes (2).

2. Affinity sensor for detecting specific molecular binding events as claimed in claim 1, characterized in that the range (4) is given a width b of under 800 nm.

3. Affinity sensor for detecting specific molecular binding events as claimed in claim 1, characterized in that the immobilized specific binding partners (5) covering also the electrodes (2) with a thickness which permits tunnel effects.

4. Affinity sensor for detecting specific molecular binding events as claimed in claim 1, characterized in that the electrodes (2) are designed as two micro-electrodes (21) each, arranged in pairs, which are connected to an amplifier circuit (8) with an associated measuring and evaluating unit (3) so that an electric current flow across the range (4) can be detected when there is a voltage applied across the electrodes (2).

5. Affinity sensor for detecting specific molecular binding events as claimed in claims 1 and 4, characterized in that the electrodes (2) are part of the amplifier circuit (8) projecting from out of the latter.

6. Affinity sensor for detecting specific molecular binding events as claimed in claims 1 and 5, characterized in that the amplifier circuit (8) is a component of a microchip (9).

7. Affinity sensor for detecting specific molecular binding events as claimed in claim 1, characterized in that the electrodes (2) are designed as comb-like meshing structures, whereby there are located affinity areas (41) at least between the respective opposing comb-type electrodes (22).

8. Affinity sensor for detecting specific molecular binding events as claimed in claims 1 and 7, characterized in that the comb-type electrodes (22) and the affinity areas (41) are arranged on a common chip surface (42).

9. Affinity sensor for detecting specific molecular binding events as claimed in claims 1 and 8, characterized in that the chip surface (42) is formed by a silicon wafer.

10. Affinity sensor for detecting specific molecular binding events as claimed in claims 1 and 8, characterized in that chip surface (42) is formed by a glass target.

11. Affinity sensor for detecting specific molecular binding events as claimed in claims 1 and 7, characterized in that the comb-type electrodes (22) are arranged in geometrical symmetry to the interdigital structures and in that a plurality of affinity areas (41) is arranged in a matrix, whereby the electrodes (2) provided outside of the affinity areas (41) are separated from each other at their intersections (23) by an insulating layer (24) arranged between the intersections.

12. Affinity sensor for detecting specific molecular binding events as claimed in claims 1 or 7, characterized in that the length of the micro-electrodes (21) is 0.1 mm, the width b of the range (4) is 0.1 µm and its effective height is 0.02 µm as well as the affinity areas (41) is at a 1:10 ratio relative to the chip surface (42).

13. Affinity sensor for detecting specific molecular binding events as claimed in claims 1 or 7, characterized in that in addition to the

affinity areas (41) at least one reference area (43) is provided which carries inactive binding partner (51) for a reference measurement instead of the specific binding partners (5).

14. Affinity sensor for detecting specific molecular binding events as claimed in claims 1 or 7, characterized in that the occupation density of the specific binding partners (5) on the individual affinity areas (41) is different.

15. Affinity sensor for detecting specific molecular binding events as claimed in claims 1 or 7, characterized in that the individual affinity areas (41) carry different specific binding partners (5).

16. Affinity sensor for detecting specific molecular binding events as claimed in the claims 1, 13, 14 or 15, characterized in that a plurality of reference areas (43) is provided being occupied with different inactive binding partner (51).

17. Affinity sensor for detecting specific molecular binding events as claimed in claim 1, characterized in that the specific binding partners (5) enter into co-ordination compounds.

18. Affinity sensor for detecting specific molecular binding events as claimed in claim 1, characterized in that the specific binding partners (5) are bioactive or biomimetic molecules.

19. Affinity sensor for detecting specific molecular binding events as claimed in claims 1 and 17, characterized in that the specific binding partners (5) are nucleic acids.

20. Affinity sensor for detecting specific molecular binding events as claimed in claims 1 and 17, characterized in that the specific binding partners (5) are proteins.

21. Affinity sensor for detecting specific molecular binding events as claimed in claims 1 and 17, characterized in that the specific binding partners (5) are saccharides.

22. Affinity sensor for detecting specific molecular binding events as claimed in claim 1, characterized in that the conductive particles (62) are defined to a size of 0.1 µm to 5 µm.

23. Affinity sensor for detecting specific molecular binding events as claimed in claim 1, characterized in that the conductive particles (62) are defined to a size in the nanometer range.

24. Affinity sensor for detecting specific molecular binding events as claimed in claim 1, characterized in that the conductive particles (62) consist of metal-cluster compounds.

25. Application of the affinity sensor for detecting specific molecular binding events as claimed in one of the preceding claims,

characterized in that the affinity sensor is utilized for the detection of complementarily associated binding partners (6) in the form of complex compounds.

26. Application of the affinity sensor for detecting specific molecular binding events as claimed in claim 25, characterized in that the affinity sensor is utilized for the detection of complementarily associated binding partners (6) in the form of bioactive and biomimetical molecules.

27. Application of the affinity sensor for detecting specific molecular binding events as claimed in claim 25, characterized in that the affinity sensor is utilized for the detection of complementarily associated binding partners (6) in the form of nucleic acids.

28. Application of the affinity sensor for detecting specific molecular binding events as claimed in claim 25, characterized in that the affinity sensor is utilized for the detection of complementarily associated binding partners (6) in the form of proteins.

29. Application of the affinity sensor for detecting specific molecular binding events as claimed in claim 25, characterized in that the affinity sensor is utilized for the detection of complementarily associated binding partners (6) in the form of saccharides.

30. Application of the affinity sensor for detecting specific molecular binding events as claimed in one of the preceding claims 1 to 24, characterized in that the affinity sensor is utilized for biomonitoring.

31. Application of the affinity sensor for detecting specific molecular binding events as claimed in claim 30, characterized in that the affinity sensor is utilized for the detection of cells.

32. Application of the affinity sensor for detecting specific molecular binding events as claimed in claim 30, characterized in that the affinity sensor is utilized for the detection of microorganisms.

33. Application of the affinity sensor for detecting specific molecular binding events as claimed in claim 30, characterized in that the affinity sensor is utilized for the detection of genetic and microbic diseases.

34. Application of the affinity sensor for detecting specific molecular binding events as claimed in claim 30, characterized in that the affinity sensor is utilized for the detection of gene expression.

35. Application of the affinity sensor for detecting specific molecular binding events as claimed in claim 32, characterized in that the affinity sensor is utilized for the detection of microorganisms in ecological populations.

36. Application of the affinity sensor for detecting specific molecular binding events as claimed in claim 30, characterized in that the affinity sensor is utilized for medical diagnostics.